

**ORDERED TWO-PHASE DIELECTRIC FILM, AND
SEMICONDUCTOR DEVICE CONTAINING THE SAME**

ABSTRACT OF THE DISCLOSURE

- 5 A porous, low-k dielectric film that has good mechanical properties as well as a method of fabricating the film and the use of the film as a dielectric layer between metal wiring features are provided. The porous, low-k dielectric film includes a first phase of monodispersed pores having a diameter of from about 1 to about 10 nm that are substantially uniformly spaced apart and are essentially located on sites of a three-dimensional periodic lattice; and a second phase which is solid surrounding the first phase. Specifically, the second phase of the film includes (i) an ordered element that is composed of nanoparticles having a diameter of from about 1 to about 10 nm that are substantially uniformly spaced apart and are essentially arranged on sites of a three-dimensional periodic lattice, and (ii) a disordered element comprised of a dielectric material having a dielectric constant of about 2.8 or less.
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